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ABSTRACT

To relate the way in which children structure stories at different age levels to their performance on other tasks or to their general stage of cognitive development, a study required subjects of four age groups to participate in working memory tasks in two different paradigms and to generate stories involving a variety of characters. The structure of the stories was related to the general stage characteristics proposed by R. Case and to subjects' performance on the two measures of short-term memory. The 60 subjects (aged 4, 6, 8, and 10) were identified by teachers and by the Peabody Picture Vocabulary Test as average in intelligence. The subjects were tested and scores on the memory tasks were obtained by averaging performance across levels. The stories generated by the subjects were tape recorded and transcribed. The first step of the analysis was to describe the structure of the stories at each of the four age levels, and determine how they were different. The story structures were described as story grammars, that stipulate a story as an episode or set of episodes temporarily or causally related. Data revealed different story structures at ages four, six, and eight, with some further development taking place at age ten. The findings suggest that elementary school aged children's narrative compositions proceed through a series of increasingly complex substages, and that a relationship exists between performance on the story tasks and on the two working memory tests. (CRH)

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Developmental Stages in Children's Narrative Composition

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Contemporary research in story structure has grown out of two traditions: (1) schema theory in psychology and (2) narrative analysis in anthropology and literature.

Psychological analysis of written discourse dates back to the work of Bartlett (1932), who showed that subjects altered poorly organized and stylistically unfamiliar stories in a variety of interesting ways, when retelling them. Subjects consistently elaborated upon the original version by adding and deleting details and temporally transposing information to compensate for lacking coherence. These elaborations suggested to Bartlett that subjects possessed a well established story "schema" or mental pattern which had been built up from previous experience and which served to organize subsequent experience.

At approximately the same time as Bartlett was investigating how subjects processed an American folktale, a Russian anthropologist, Valadimir Propp, was independently investigating the structure of the Russian folktale. In The Morphology of the Folktale, Propp (1968) examined one hundred Russian folktales and identified the characters' actions which were significant to the course of the story (e.g. pursuit, departure). After symbolizing each action or "function", he combined the symbols to form an abstract representation of the story's plot. Based on this analysis, Propp concluded that a limited number of functions existed and that they repeatedly appeared in a standard order. Hence, he developed a syntax for simple narratives, composed of functions or fixed themes, which characterized the structures of Russian folktales.

Although Propp's work exerted an influence in anthropological study of folktales (Dundes, 1964, and Colby, 1973) and on literary ctiticism (Levi-Strauss, 1976, Barthes, 1975, and Prince 1973), it, like Bartlett's story schema work, made little impact on psychology for many years. However, with the advent of cognitive science, more sophisticated analytic tools became available which made the psychological investigation of story comprehension and composition possible. Hence, previous work which dealt with the structure of a typically formed story was re-examined and expanded. Rumelhart (1975), who related his work to that of Bartlett and Propp, was one of the first to attempt this task. He proposed a model of the sorts of events, and the relations between them, that typically occur in folktales. He also suggested that, in listening to a new story, subjects map the surface events onto their model of the "prototypic" structure. Using linguistic formalism (i.e. rewrite rules), Rumelhart devised a "story grammar" which characterized the knowledge which permitted them to do so.

Although the earliest story grammars could only be applied to simple folktales, later versions (Mandler and Johnson, 1977, Stein and Glenn, 1979, and Mandler and Johnson, 1980) were designed to be applicable to more complexly structured narratives. The general sorts of categories which were proposed included such categories as "settings" and "initiating events"; and the kinds of relations among these categories include such relations as co-occurrence and causation. The reality of these categories and relations has been demonstrated in two strands of empirical research. First, the findings of studies which investigated subjects' comprehension and recall of stories strongly suggest that specific

categories are necessary to the structure of a story, and that these categories, when arranged in a standard order, facilitate story comprehension and recall (Thorndyke, 1977, McClure, Mason, and Barnitz, 1979, and Stein and Glenn, 1979). Young children are especially reliant on standard order in story structure, while older children are slightly less reliant. Adult subjects' responses are still less influenced by story structure (Mandler and Johnson, 1977, and Mandler 1978). Furthermore, even under standard story structure conditions, a developmental trend toward improved comprehension and recall was noted (Mandler and Johnson, 1977). Therefore, while both children and adults have a firmly established schema which aids comprehension and recall, older children and adults have adapted the schema to include alternate versions of the standard form. The second strand of empirical work looked at childrens' story composition. It showed that the stories composed within a given age range share a common structure (Leonard, 1977) and that older childrens' stories are more complexly structured than those of younger children (Botvin and Sutton-Smith, 1977, Stein, 1979). However, as yet, no attempt has been made to relate the way in which children structure stories at different age levels to their performance on other tasks or to their general stage of cognitive development.

That was the object of the present study. Subjects at four ages were selected, and asked to generate stories involving a variety of characters. An attempt was then made to relate the structure of the stories to the general stage characteristics proposed by Case and to subjects performance on two measures of short term memory.

METHOD

Sixty subjects at four age levels (i.e. four, six, eight, and ten years) were tested. These ages were chosen because, at these points, the cognitive strategies used are typical of the substages proposed by Case.

The procedure for selecting subjects, whose performance typified specific substage developmental patterns, consisted of two steps. First, teachers were asked to identify average to high average students. Second, to confirm the teacher's selection, each student was individually given the Peabody Picture Vocabulary Test, which is a test of receptive language. All subjects selected for the study were of average intelligence.

Experimental Tasks. Two sets of tasks were individually presented to the subjects.

(1) Working Memory Tasks.

To assess working memory capacity, the number of items a subject could recall and respond to was tested in two different paradigms: (1) Subjects were presented with a cartoon figure (Mr. Cucumber) upon which coloured stickers were affixed at various positions. They were instructed to note the position of the stickers and respond by indicating the positions on a stickerless figure. Following three practice trials, in which left-right transpositions were corrected, test items were presented in order of increasing difficulty. The number of stickers increased from one to six across the six levels, with three trials at each level. Inaccurate responses on all three trials at a given level constituted failure. Scores were obtained by averaging performance across levels. (2) Subjects were verbally presented with five set sizes of familiar, one-syllable words. They were instructed to listen to the entire set, and then to respond by stating the opposite of each word in the set.

In a brief training session the correct response to each item was modeled by the Examiner and one-item practice trials were given. On the actual test administration the number of words in each test item increased from one to five across the five levels. Five trials were given at each level. Administration of test items continued until all five trials at a given level were failed. The score was obtained by averaging performance across levels.

(2) Story Telling Tasks.

On a final set of tasks, subjects were asked to tell stories. Characters that frequently appear in childrens' literature were specified (e.g. a happy little girl, a cute little lamb). The number of characters included in the tasks differed among the age group. Four year olds were asked to tell stories about one and two characters; six year olds were given one, two, three, and four characters; eight and ten year olds were presented with two, three, and four characters. The 187 stories were tape recorded and later transcribed by the Experimenter.

Results

The first step of the analysis was to describe the structures of the stories at each of the four age levels, and to determine if subjects within a given level generated structures different from those of another level. Following the general format of Stein and Glenn (1979), the story structure was modeled as a "story grammar". The grammar stipulates the story as an episode or set of episodes. Each episode inturn, can be rewritten as a series of major event categories which are temporally and/or causally interrelated: (1) Setting - the state which exists at the outset of the episode, including information about the time, place, protagonist, and

frequently, the protagonist's condition. (2) Initiating Event - the first action which occurs in the event sequence. It can involve setting up a problem, goal or desire or can be a movement toward the resolution of a problem, goal or desire which was formulated in the setting. (3) Response - a description of the protagonist's reaction to the event which initiated the sequence, often related to his/her reaction to the problem, goal, or desire. The response can include an internal emotional reaction as well as an overt action. (4) Outcome - the final step in the event sequence which represents its termination. The outcome either describes the resolution of the issue around which the story is built or represents closure on the event sequence but not on the central problem. In the latter case, the outcome is carried over to the following episode to serve as the initial state. Hence, just as the categories within the episodes are related, so the episodes are related to one another by "nesting". Thus, a story structure, composed of related episodes, was constructed. To demonstrate the application of the story grammar, the analysis of a prototypic story for each age level is presented in Figure 1 - A through D.

Different story structures were discovered at age four, six, and eight, with some further development taking place at age ten. At four years of age, children were typically capable of generating four related categories which were temporally and causally related and so combined to form an episode. Although the episode centered around an integrated event sequence (eg. a girl and a lamb are walking along. They see their home and go in.), it lacked "point". That is, the stories were script-like concatenations of events. A prototypic four-year-old story grammar analysis

is presented in Figure 1 - A.

Six year olds, on the other hand, produce more "story-like" stories by introducing a problem, goal, or desire, thus providing a reason for or point to generating the event sequence. In other words, the event sequence is placed in the context of the problem. Structurally, the stories are typically composed of two related episodes. In the first, the problem is presented and immediately resolved. The second episode resembles the four year old production, in that it is an event structure that elaborates upon the resolution. For example, in the first episode of a prototypic six-year-old story, a baby lamb is isolated and lonely. A horse rescues the lamb and they go away together. In the second episode they engage in a series of fun activities. The story grammar analysis is presented in Figure 1 - B.

At the eight- year level, children also generate an event sequence which is centered around a problem, goal, or desire. However, in addition to this major plot, they produce a sub-plot which bars a straight-forward problem resolution. For example, a lost little lamb is found by a girl. Her goal is to care for it (major plot). However, her father prevents her from reaching her goal by refusing her request to keep it (sub-plot). The little girl now has two problems with which to deal - a lamb that needs care and a father to be "gotten around". Her attempt to look after the lamb resolves only the goal of the major plot. However, the resolution of the story solves both the problem of the major plot and that of the sub-plot by having the father suggest an alternate situation in which the lamb can be cared for. The story grammar analysis is presented in Figure 1 - C.

At the ten-year level, children elaborate upon the eight year old structure by generating an additional episode which "fleshes out" the story.

Frequently the additional episode develops the resolution more fully. For example, a little girl wants a pet (major problem). A little goat is born. However, the little goat is frail (sub-problem). The girl's father allows her to have the goat as her pet and she cares for him (solution). Up to this point the story is similar to the eight year old version. In the additional episode, the goat is attacked and killed (possibly as a result of his frailty). The girl's father quickly replaces the loss (resolution). The story grammar analysis is presented in Figure 1 - D. To test the reliability of the story grammar, two raters applied the grammar to the stories, An overall correlation of 0.91 was found between the two raters' analysis of episodic structure.

The next step in the analysis was to relate these general structures to the qualitative and quantitative descriptions of childrens' cognitive functioning suggested by Case. At level 0 (age four), it was presumed that children are consolidating the general notion of an episode or unified event sequence so that its four basic categories can be treated as a single unit. Furthermore, it was presumed that, when consolidated in this fashion, the generation of an episode would require a working memory of one. At level 1 (age six), it was presumed that children coordinate two of these global schemes so that a qualitatively different type of thinking emerges. That is, they coordinate an event sequence and a problem, goal or desire and so are able, for the first time, to compose stories with a "theme" or "point". When two such global schemes are coordinated in a story composition, a working memory of two would be required. A parallel can be drawn between performance on the story task and the balance beam task, where six-year-olds coordinate the quantification dimension with the

weight dimension. At level 2 (age eight), it was presumed that children focus on two different problem related event sequences, that is, the major plot and the sub-plot or complicating event, both of which are resolved in the ending or outcome. Comparable performance on the balance task involves focussing on two quantifiable dimensions (i.e. weight and distance, and considering both to predict which side of the balance beam will go down. When this type of bifocal coordination occurs, a working of three would be required. Al level 3 (age 10), it was presumed that children elaborated upon the previously existing structure by generating an additional episode. Comparable performance on the balance beam task involved elaborated quantification of the two dimensions. A working memory of four would be required.

The third and final step in the analysis was to apply statistical tests to the data to determine whether the hypothesized relationship, between childrens' structural scores and their scores on the working memory tests, existed. The results of a repeated measures ANOVA showed that there was a significant age effect ($F = 19.23$, $p < .0001$) but no significant task or task X age interaction. The positive correlation between the working memory demand of the story structures and those of the two working memory tests were significant ($r = 0.39$, $p < .01$; $r = 0.46$, $p < .01$). The relationship between the mean story structure working memory demand scores and those of the two working memory tests is graphed in Figure 2. The means are reported in Table 1.

Conclusions

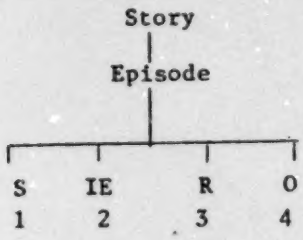
It is concluded, therefore, that elementary school aged childrens' narrative compositions proceed through a series of substages, each of which is more complex than that which preceeds it. Furthermore, a relationship exists between performance on the story tasks and on tasks which involve very different content (i.e.. the two working memory tests).

Figure 1

Story Grammar Structures Across the Four Age Levels

Figure 1 - A

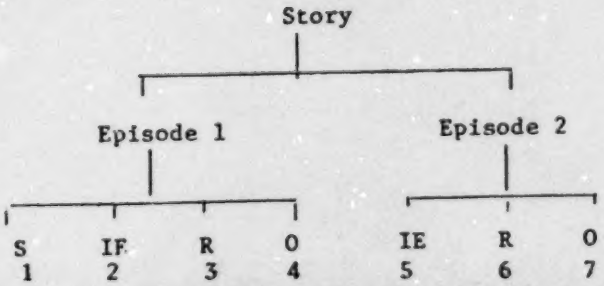
Four Year Level



1. Once there was a lamb and a girl walking down to get home
2. So they saw their mother's house
3. And they went in it and they saw their mother
4. That's where they lived and they lived happily ever after.

Figure 1 - B

Six Year Level



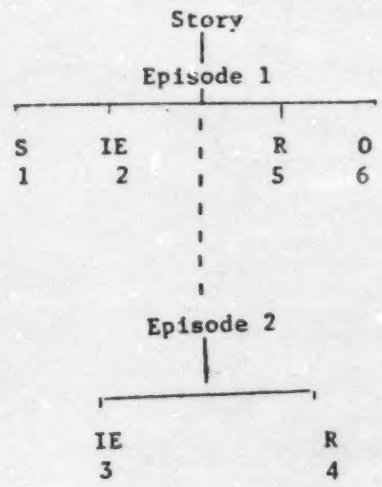
1. A horse was walking along in a field and he saw a little lamb in one of the places of the barn.
2. And it was in a fence and it was a little baby lamb and it was lonely
3. So the horse jumped in and then the lamb jumped onto the horse
4. And then they got out
5. And then they went to a place where there was no one except them
6. And they picked some blueberries and they ate them. And the horse found some hay and he liked the hay better than the blueberries. And a lamb found some grass and he liked the grass better than the blueberries
7. And then they went and lived together and they lived happily ever after.

S - Setting
IE - Initiating Event
R - Response
O - Outcome

FIGURE 1 (continued)

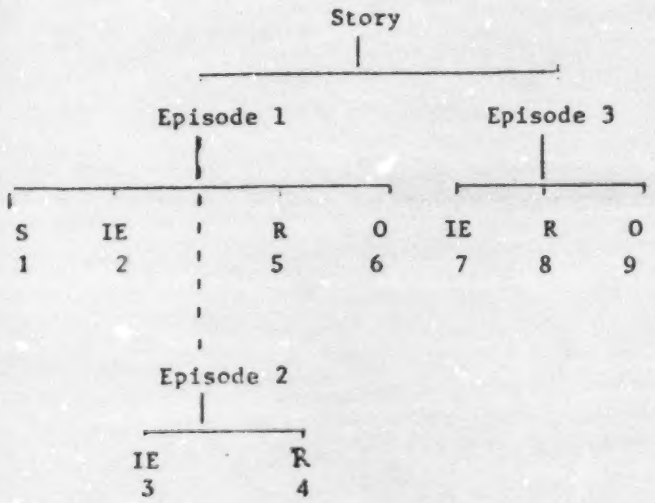
Story Grammar Structures Across the Four Age Levels

Figure 1 - C
Eight Year Level



1. Once there was a little girl who was walking in the woods
2. And she saw a helpless little lamb
3. And then she took it to her father
4. but her father said she can't keep it
5. So then she built a house for it in the woods and kept it there and brought food for it everyday
6. And then her father and mother found out that she was keeping the lamb and so they told her they should send her to a place where lambs live.

Figure 1 - D
Ten Year Level



1. Once upon a time there was a little girl. She was very sad because she didn't have a pet.
2. One day one of her father's - father's sheep had a little goat
3. because she had lots of others and it couldn't get enough milk
4. And it was going to die
5. She wanted it so badly. And then her father finally gave up and gave it to her
6. She was very happy. After that she always lived with it and was always happy with it. She took good care of it and was very happy with it.
7. Then one day a ram came and he was- the lttle girl was inside eating her supper. The ram came along and killed the little goat and ate it.
8. She - finally she came out and she saw the little goat was dead - had been taken away. She was very sad
9. Her father went out and bought her another lamb and she lived happily ever after.

FIGURE 2

MEAN SCORES OF STORY STRUCTURE,

MR. CUCUMBER, AND OPPOSITES FOR THE FOUR AGE LEVELS

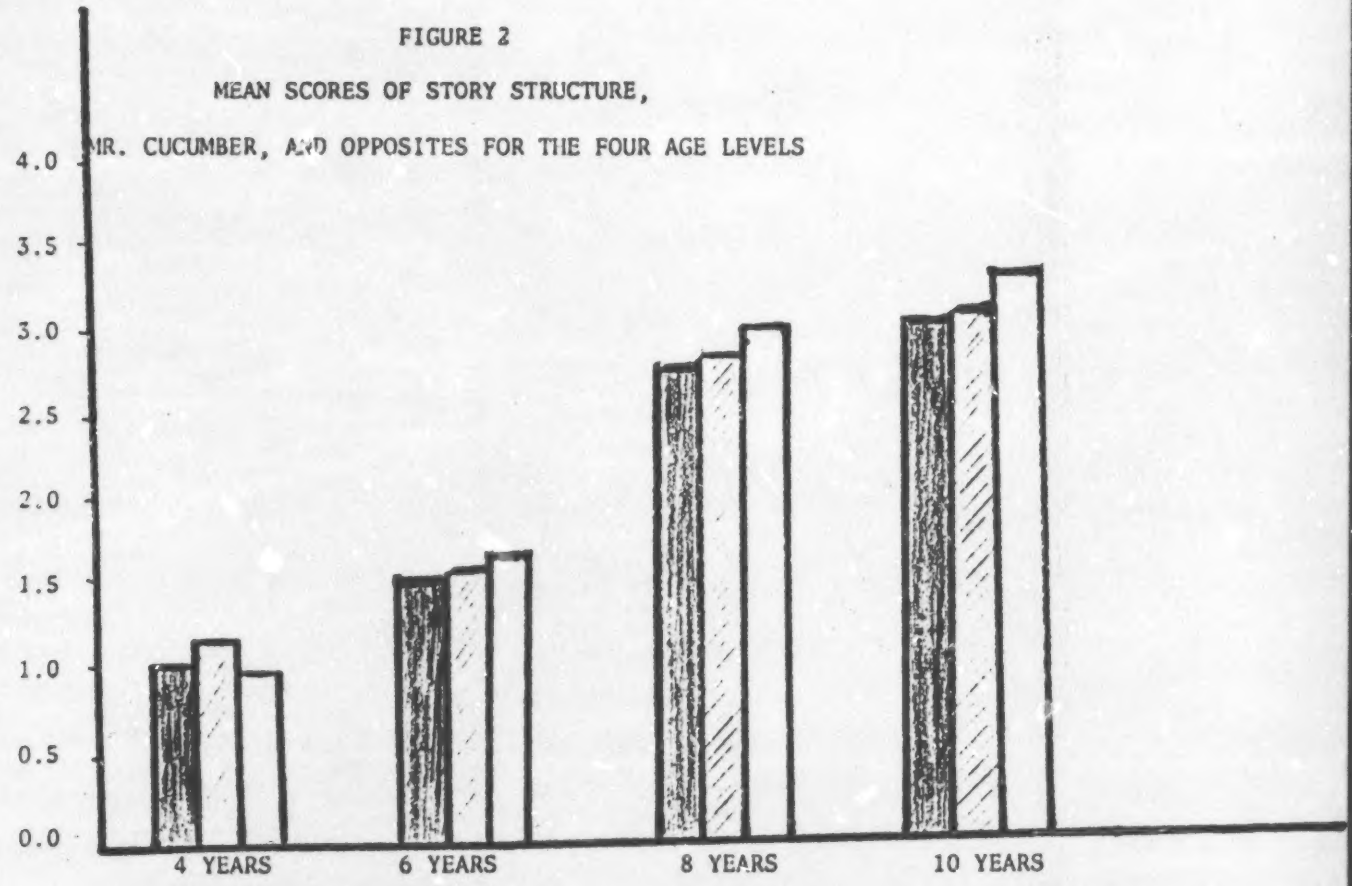


TABLE 1

MEAN SCORE OF STORY STRUCTURE,

MR. CUCUMBER, AND OPPOSITES FOR THE FOUR AGE LEVELS

AGE LEVEL	STORY STRUCTURE	MR. CUCUMBER	OPPOSITES
4	1.11	1.17	1.09
6	1.44	1.54	1.59
8	2.68	2.71	2.87
10	2.88	2.96	3.35

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